The opinion in support of this decision is <u>not</u> binding precedent of the Board.

Paper No. 40

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

MAILED

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PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MOTOKI KATO

Appeal No. 2000-1924
Application No. 08/634,122

ON BRIEF

Before MARTIN, BARRY, and SADAAT, Administrative Patent Judges.

MARTIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-3, 5-10, and 12-14, all of the pending claims, under 35 U.S.C. § 103(a). We reverse.

A. The invention

The invention relates to the encoding, recording, and decoding of "P" picture data, which the application explains is

data representing an inter-frame predictive coded picture. Specification at 21, ll. 2-3.

Figure 1 shows the hierarchy of the data of a video bit stream in the MPEG 1 format. Specification at 2, ll. 3-5. A sequence layer includes a plurality of sequence headers SH and their associated GOP ("group of pictures") data. The GOP layer includes a plurality of GOP headers (GH) and their associated "picture" data. The picture layer includes a plurality of picture headers PH and their associated "slice" data, and so on down through the slice layer, macro block layer, and block layer.

Figure 4 shows the data included in the picture header PH. The header data following the extension start code was newly added by the MPEG 2 format. Specification at 19, ll. 8-13. If the encoder determines that the extension start code and the succeeding header data are the same for two successive pictures, that data is not transmitted as part of the header for the second picture. Id. at 20, ll. 1-20. However, the header data which precedes the extension start code is transmitted with every picture regardless of whether it remains the same for successive pictures. Id. at 20, ll. 20-21. In the decoder, the extension start code and succeeding picture header data, if any, are stored

for reuse with a successively received picture which does include such data. Id. at 23, ll. 11-21.

B. The claims[1]

Claims 1, 3, and 8, which are representative, read as follows:

> 1. A picture encoding apparatus for forming an encoded P picture signal, comprising:
>
> memory means for storing first control data included in header data of a P picture to control a P picture encoding condition;
>
> comparator means for comparing the first control data with second control data included in a next header data of another picture; and
>
> means for changing the P picture encoding condition and for encoding an input signal to a P picture according to an output signal of said comparator means, when the first control data and the second control data are different from each other.
>
> 3. A picture decoding apparatus for decoding an encoded P picture signal, comprising:
>
> memory means for storing control data included in header data of a P picture; and
>
> decoding means for decoding a succeeding encoded P picture signal by using, when a next header data of said succeeding encoded P picture does not contain

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[1] It is noted that the amendment (Paper No. 14) presenting the claims on appeal, i.e., claims 1-3, 5-10, and 12-14 as twice amended, has yet to be formally entered.

control data, the control data stored in said memory means.

8. A picture encoding method for forming an encoded P picture signal, comprising the step of:

comparing first control data, which is included in header data of a P picture, with second control data included in a next header data of another picture; and

encoding the remarks [sic] second control data only when the first control data and the second control data are different from each other.

C. The reference and rejections

The rejections are based on the following U.S. patents:

Morrison et al. (Morrison)	4,985,766	Jan. 15, 1991
Raychaudhuri et al. (Raychaudhuri)	5,122,875	June 16, 1992
Fujinami	5,343,248	Aug. 30, 1994 (filed July 16, 1992)

Claims 1-3, 5, 8-10, and 12-14 stand rejected under § 103(a) for obviousness over Morrison in view of Raychaudhuri.

Claims 6 and 7 stand rejected under § 103(a) for obviousness over Morrison in view of Raychaudhuri and Fujinami.

Appellant and the examiner treat claims 1 and 2 as standing or falling together, claims 3, 5-7, 10, and 12-14 as standing or falling together, and claims 8 and 9 as standing or falling together (Brief at 6; Answer at 3).

D. Appellant's burden of persuasion on appeal

Appellant bears the burden of explaining why the evidence on which the examiner relies is insufficient to establish a *prima facie* case of obviousness or demonstrating that appellant has provided evidence which rebuts the *prima face* case of obviousness. *See In re Rouffet*, 149 F.3d 1350, 1355 47 USPQ2d 1453, 1455 (Fed. Cir. 1998):

> To reject claims in an application under section 103, an examiner must show an unrebutted *prima facie* case of obviousness. *See In re Deuel*, 51 F.3d 1552, 1557, 34 USPQ2d 1210, 1214 (Fed. Cir. 1995). In the absence of a proper *prima facie* case of obviousness, an applicant who complies with the other statutory requirements is entitled to a patent. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness. *See id*.

Appellant challenges the sufficiency of the evidence on which the examiner's *prima facie* case is based.

E. The merits of the rejections

Raychaudhuri is relied on for its disclosure of MPEG and MPEG-like encoding techniques (Final Office action at 4-5), which include the use of P frames (e.g., col. 9, ll. 5-6). Fujinami is relied on for its disclosure of recording picture signals.

Appellant does not question the combinability of these references with Morrison. Instead, Appellant faults Morrison for failing to disclose or suggest comparing the header data of different pictures, using the results of such a comparison to determine which header data to transmit, or using received header data for one picture to decode data for another picture.

Morrison explains that the overhead data can be in the form of picture headers, group headers, and block headers:

> Although not in principle essential, the coder may provide for the coding of overhead information in respect of a complete frame of the picture, or of a group of blocks. Typically these may include some or all of the following, viz:
>
> a picture header which occurs at the start of the picture;
>
> a group header which precedes a group of blocks; and
>
> a block header, previously discussed.
>
> The reason for this arrangement is that it may be possible to reduce the overall quantity of data to be transmitted; for example, a single motion vector or quantisation strategy may suffice for the whole picture, or a group of blocks; where an entire group of blocks does not require picture information to be transmitted, a single header will suffice. Also, non coding-related information concerning the picture may be inserted.

(Emphasis added.) (Col. 4, ll. 32-49.) Describing the operation of the encoder shown in Figures 1 and 2, Morrison states that "[a]t the start of each group of blocks the control unit 27

receives a 'group-of-blocks' header sequence. Also, at the start of each picture the unit 27 receives a 'picture' header sequence." (Col. 5, ll. 1-4.)[2] The picture header and the first group header are sent to control unit 27 "while the FIFO 21 is filling up with the first block of coefficient data and the coder 25 is calculating the first block's overheads" (col. 5, ll. 4-6).

Morrison describes these picture and group headers as being stored in FIFO 22 under the control of control unit 27 without any mention of comparing them to each other, with block headers, or with headers from another picture: "The unit 27 stores the picture overheads and group overheads in the FIFO 22, along with their word identity codes (the word identity code indicates to the VLC coder which particular overhead the word represents.") (Col. 5, ll. 6-10.) Morrison next explains:

> At the beginning of the next block, i.e. the second block of that group, <u>the control unit 27</u> receives the data from the precoder 25 and then <u>decides</u>, according to instructions within the data received from the precoder 25 and the 'group-of-blocks' and 'picture' header sequences, <u>which of the overheads are to be transmitted and writes them to the FIFO 22</u>,

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[2] The examiner's argument that the phrase "'picture' header sequence" refers to a plurality of picture headers (Answer at 6) is contrary to the fact that a "'picture' header sequence" occurs at the start of <u>each</u> picture, which makes it clear the phrase is referring to the sequence of data bits that make up a single picture header.

> along with their associated word identity codes[] (e.g. motion vector information may be omitted where the motion compensation code indicates that no motion vector is required, or where the information is carried by "group of blocks" header).

(Emphasis added.) Column 5, lines 11-22. Appellant and the examiner, incorrectly in our view, construe the term "overheads" in the foregoing passage to include picture and group overheads. Appellant, for example, describes the foregoing passage as disclosing that control unit 27 "determines which of the picture or group overheads is to be transmitted and subsequently writ[ing] them to the FIFO 22 along with their associated word identity codes." Reply Brief at 2. The examiner similarly characterizes control unit 27 as omitting redundant picture headers. Answer at 8.

The foregoing interpretation fails to take into account the fact, noted above, that the picture header and first group header are stored in FIFO 22 (col. 5, lines 1-9) <u>prior</u> to the time that control unit 27 determines which "overheads" to store in FIFO 22 (col. 5, lines 10-22). Also, the succeeding paragraph in column 5 describes the omission of only <u>block</u> overheads:

> There are four possible combinations of coefficient data from FIFO 21 and <u>block</u> overhead data from FIFO 22:

(i) No overheads and no coefficient data; in which case nothing is stored in either FIFO 21 or FIFO 22 for that block.

(ii) Overheads plus coefficient data, in which case overhead data, a SWITCH word and an end-of-block code are stored in FIFO 22, and coefficient data are stored in FIFO 21.

(iii) Overheads and no coefficient data, in which case overhead data are stored in FIFO 22, but no SWITCH word, end-of-block code or coefficient data are stored.

(iv) <u>Coefficient data and no</u> [<u>block</u>] <u>overheads; this can occur when the picture or group header contains sufficient information to characterise the block in question</u>. In this case coefficient data is stored in FIFO 21, and a SWITCH word and an end-of-block code only are stored in FIFO 23 [sic, 22].

(Emphasis added.) Column 5, lines 28-47.[3] Likewise, only block overheads are described as being omitted in lines 60-64 of column 3: "[F]or any block, overheads may be present without coefficients, or both may be absent, or (where picture or group overheads are present) coefficients may be present <u>without block overheads</u>." (Emphasis added.)

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[3] The examiner is therefore incorrect to state that condition (iv) represents a case where a <u>picture</u> header has some information omitted from it (Answer at 7).

For the foregoing reasons, we conclude that the term "overheads" in the passage in question (col. 5, ll. 10-22) is collectively referring to the components of a single block header, each of which includes the following components:

> Block position--calculated later
> Mode (intra/interframe)--from control line 11
> Filter data--from control line 12
> Type of quantisation--from quantiser 4
> Code indicating whether motional compensation is used
> Block motion Vector--from motion compensation unit 14
> Coefficient sequence--from quantiser 4
>
> Also output is a signal CL which indicates if no coefficients are being output for that block.

Column 3, ll. 23-24. That a single component of a block header may be omitted is apparent from Morrison's explanation that "motion vector information may be omitted where . . . the information is carried by [a] 'group of blocks' header" (col. 5, ll. 18-22), which can include a "Group motion vector" as one of

its components (col. 4, l. 66).[4] Morrison also explains that two of the components of a block header may be omitted: "[A] single motion vector or quantisation strategy [two components of a block header] may suffice for the whole picture, or a group of blocks" (col. 4, ll. 44-46).

Despite our disagreement with Appellant's view of which type of header data Morrison omits, we find ourselves in agreement with Appellant's argument that Morrison fails to disclose or suggest <u>comparing</u> header data from two different <u>pictures</u>, as required by claims 1 and 8. As already noted, control unit 27 compares block headers with picture and group headers from the <u>same</u> picture. Moreover, Morrison describes his overheads as

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[4] Morrison states that the picture and group headers may include some or all of the following components:

Picture header
- Start code
- Buffer state
- Picture number (a modulo n number (e.g. n=64) incremented by 1 for each successive picture)
- Type of picture (split-screen, document etc)

Group Header
- Group position
- Mode (intra/interframe)
- Filter data
- Type of quantisation
- Code indicating whether information for the block is to follow
- Group motion vector

Column 4, ll. 50-66.

representing, at most, a "complete" or "whole" picture, which we understand to mean a single picture. See column 3, lines 44-48 ("It is assumed that the overhead information are generated in blocks which correspond to blocks of the picture. The possibility of also generating overhead blocks for a complete picture or groups of blocks within a picture will be discussed later.") (Emphasis added.) See also column 4, lines 42-48 ("[I]t may be possible to reduce the overall quantity of data to be transmitted; for example, a single motion vector or quantisation strategy may suffice for the whole picture, or a group of blocks; where an entire group of blocks does not require picture information to be transmitted, a single header will suffice.") (Emphasis added.)

Nor is a picture-to-picture comparison of overhead data by the encoder implied by the structure of the decoder (Figure 3), as argued by the examiner (Answer at 9). In fact, the examiner (Answer at 9) is incorrect to characterize column 7, lines 65-68 and column 8, lines 10-14 as describing resetting of the decoder to its base address "in response to a detected error of a start code," thereby "giv[ing] the decoder access to overheads from the preceding picture that can be used to decode the current picture." Sequencer 44, which is the subject of those two cited

passages, is not described as being reset by picture start codes, not erroneous picture start codes: "The memory is programmed so that, following resetting to a base address by a picture start code, it produces a sequence of word identity codes corresponding to the transmission sequence described earlier" (col. 8, ll. 10-14). The "sync error" flag generated by sync detector 41 when an invalid picture start code (PSC) is received (col. 7, ll. 66-67) is not applied to sequencer 44; instead, it is applied to clock generator 42, which defaults to the nominal clock frequency when PSC errors have been detected (col. 8, ll. 49-53).

The examiner's reliance (Answer at 9) on the decoder's picture repeat function (col. 9, ll. 22-31) to show that different picture headers are compared in the encoder is also misplaced. Picture repeat control 46

> checks that there are at least two picture start codes in the buffer unit 47 ready for the demultiplexer 49 to process a complete picture. If this condition is not maintained, the picture repeat control unit issues a picture repeat command to the demultiplexer, instructing it to stop reading the buffer and wait for the next picture sync signal before continuing its processing. The result is that the reconstituted picture is not updated with new information and is effectively repeated.

Column 9, lines 22-31. Morrison does not indicate that the absence of one of the start codes in the buffer is due to the

fact that it was omitted from the data transmitted by the encoder.

For the foregoing reasons, the rejection of claims 1 and 8, which recite encoding involving the comparison of header data from different pictures, is reversed, as is rejection of dependent claims 2 and 9.

Morrison's picture repeat function also fails to satisfy decoder claim 3, which recites "memory means for storing control data included in header data of a . . . picture" and "decoding means for decoding a succeeding encoded . . . picture signal by using, when a next header of said succeeding encoded . . . picture does not contain control data, the control data stored in said memory means." As noted above, when picture repeat control 46 determines that the buffer does not contain two start codes, demultiplexer 49 ceases reading out the buffer, with the result that the "reconstituted picture signal" is not updated with new information and is thus effectively repeated (col. 9, ll. 29-31). The term "reconstituted picture signal" refers to the picture signal generated by picture decoder 50, which can be identical in construction to the local decoder enclosed in the dashed-line box in Figure 1 (col. 9, ll. 14-16), which contains a frame store 6 (col. 2, ll. 44) for storing the reconstituted (i.e., previously

decoded) picture information. Repeating the reconstituted picture signal does not involve using the picture overhead data stored in FIFO 490 of demultiplexer 49 (col. 9, ll. 2-3) a second time for the purpose of decoding the currently received picture information. The rejection of claim 3 is therefore reversed, as are the rejections of claims 5-7, 10, and 12-14, which the examiner has treated as standing or falling therewith.

REVERSED

JOHN C. MARTIN Administrative Patent Judge	
LANCE LEONARD BARRY Administrative Patent Judge	BOARD OF PATENT APPEALS AND INTERFERENCES
MASHID D. SADAAT Administrative Patent Judge	

JCM/sld

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